

Our Polar Islands— The Queen Elizabeths



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The mountains of the United States and British Empire Ranges in western Grant Land on north-west Ellesmere Island, through which the great ice-field that covers much of Grant Land drains along massive valley glaciers, many of which show few signs of activity. The one in the foreground, draining into Yelverton Bay in the upper right, has its surface inscribed with a supra-glacial drainage pattern of some complexity. This westward view shows the variety of structural conditions in the area: in some places the sediments lie horizontally, and in others they dip steeply to the south. The sharp crested ridge and V-shaped upland valley are characteristic land-forms here, but in places (such as just left of centre in this photograph) some valleys have a U-shaped cross-section.

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Cover Subject: Looking eastward along the south coast of Devon Island from an altitude of 20,000 feet with Lancaster Sound to the right. The fiord-like inlets along the coast are excavated largely out of horizontal sedimentary strata (limestones, sandstones, shales and conglomerates), but towards the east they thin out into the underlying Precambrian formation of which that in the foreground (at the head of Burnett Inlet) probably forms part. The Devon Ice-field is visible in the left background. Most of the inter-fiord peninsulas are capped with small local ice-fields from which infrequent small glacial tongues reach tidewater. The outwash plain at the head of the inlet in the foreground and the alluvial fans along the broad valley walls are typical of these inlets.

Our Polar Islands— The Queen Elizabeths

by ANDREW TAYLOR

Except where credited, photographs by R.C.A.F

FOR CENTURIES our Northern Archipelago has been divided into two parts, known as the Eastern and Western Arctic by virtue of the directions from which access may be had to it. The intervening boundary lay west of Hudson Bay, extending uncertainly northward along the axes of Boothia Peninsula and Somerset Island before losing itself in the islands to the north. Some of these northern islands have been equally inaccessible by sea from either direction, so that the definition of this dividing boundary failed in high latitudes. The advent of air travel in the far north gave an approach from the south to the well-defined group of islands beyond Barrow Strait, and helped gradually to shape them into a regional arctic entity. They had sometimes been called the Northern Islands Region, but recently were named the Queen Elizabeth Islands after Her Majesty the Queen. With the Eastern and Western Arctic lying roughly south of latitude 75° north, they form the northernmost of the three regional areas comprising the Canadian Arctic. The Queen Elizabeth Islands lie north of the great east-west passage which transects the archipelago from M'Clure Strait to Lancaster Sound. They are Canada's isles of the polar sea, the most northerly lands in North America.

General Description

As a group, the Queen Elizabeth Islands are generally triangular in arrangement, with the base fixed along the passage mentioned above. To the north-west the islands extend to the Beaufort Sea, from Prince Patrick Island to north-western Ellesmere Island. To the east, the islands are fringed by Baffin Bay and several passages which separate them from north-west Greenland. The principal islands in the group with their areas in square miles are as follows:

Ellesmere..... 82,119

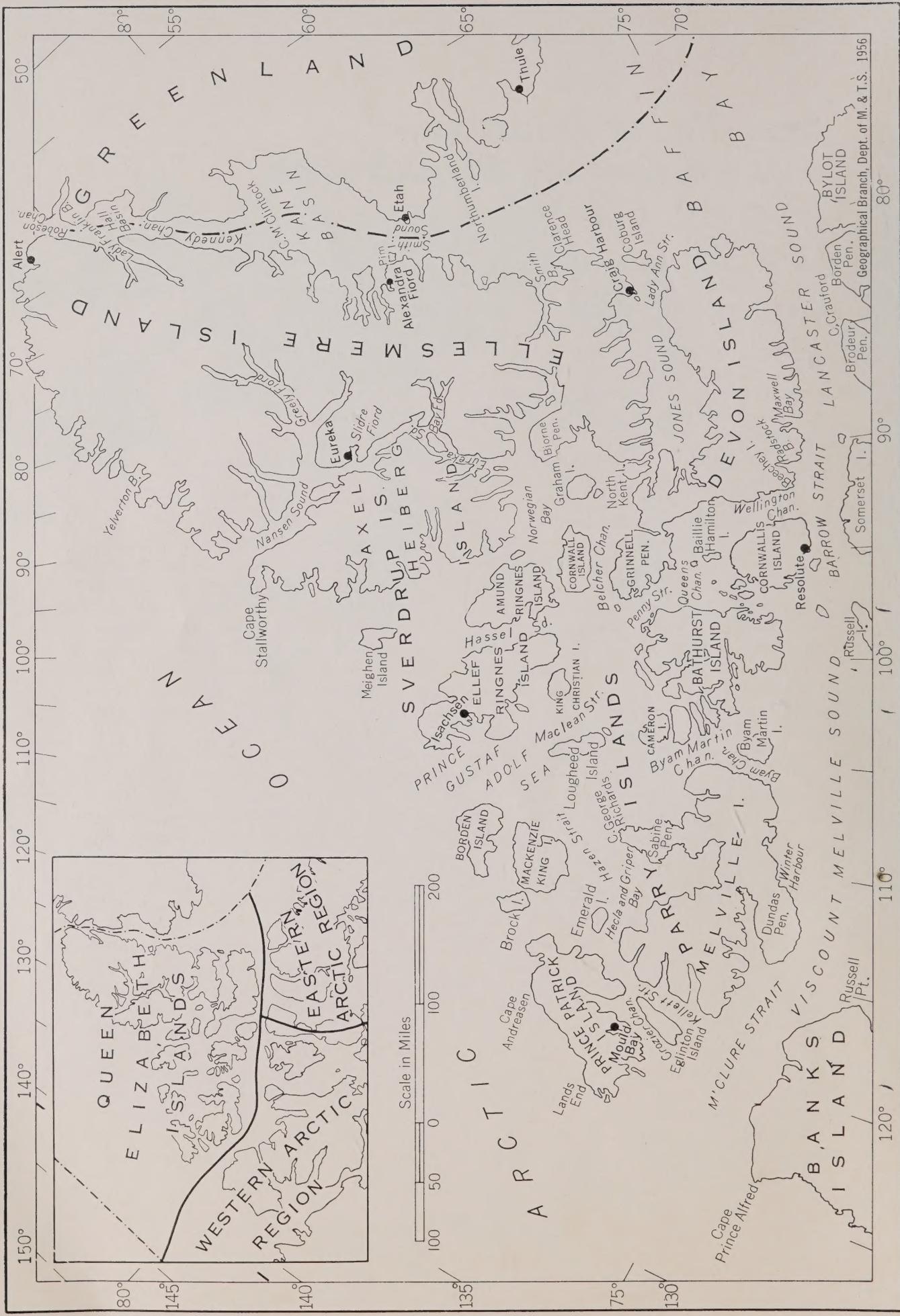
Devon.....	20,861
Melville.....	16,141
Axel Heiberg.....	15,779
Prince Patrick.....	6,081
Bathurst.....	6,041
Ellef Ringnes.....	5,139
Cornwallis.....	2,670
Amund Ringnes.....	2,515

In all, the land area of the Queen Elizabeth Islands totals 165,500 square miles.

Exploration

The early history of exploration of the islands is lost in antiquity. Archaeological evidence indicates Eskimo occupancy perhaps a thousand years ago. There is some controversial evidence that the Norsemen, extending their voyages westward from Greenland, were the first white men to visit the islands, possibly in the twelfth or thirteenth centuries. Monuments attributed to them have been found on east Ellesmere Island and on an islet in western Jones Sound.

William Baffin was undoubtedly the first to leave us a written record of their discovery after tracing the outline of Baffin Bay as mate on Robert Bylot's *Discoverie* in 1616. For two centuries Baffin's survey was shown on maps apologetically, with the remark "...according to the relation of William Baffin, but not now believed". Sir John Ross in 1818 during an unsuccessful search for access to the North-west Passage corroborated Baffin's discoveries, but travelled no farther westward as he believed passage was blocked by a range of highlands, the mythical "Croker Mountains," which he was convinced lay across Lancaster Sound. The next year Ross' lieutenant, Captain W. E. Parry, entered this Sound to open a great incision into the blankness of the polar map by sailing boldly across the "Croker Mountains" through Barrow Strait and Viscount Melville Sound to



M'Clure Strait to discover and name all the islands along the north side of the great east-west passage. This group is still referred to as the Parry Islands. In 1829 Ross retraced the westward course of his junior but turned south into Prince Regent Inlet.

The next impetus given the exploration of the Queen Elizabeth Islands resulted from the wintering of Captain Sir John Franklin's expedition at Beechey Island (south-western Devon Island) in 1845-6 and the subsequent complete disappearance of the expedition. It is now known that Franklin circumnavigated Cornwallis Island to latitude 77° north before sailing south down Peel Sound and disappearing with his two vessels north-west of King William Island. The search for Sir John Franklin occupied ten years.

Following Sir James Clark Ross' abortive search of the coasts of Somerset Island (1849-50), the joint expedition of Captain H. T. Austin and Captain William Penny, a whaling skipper, resulted in the search of Wellington Channel, M'Dougall Sound, and Byam Martin and Austin Channels, involving the survey of parts of Devon, Cornwallis, Bathurst, Byam Martin, and Melville Islands. Sir Edward Inglefield in 1852 briefly looked into Jones Sound to investigate reports by a whaler of the discovery of a cairn on the north coast of Devon Island. He also sailed north into Smith Sound. Voyages by Captains W. Kennedy and C. C. Forsyth and Lieutenant Edwin De Haven added minor cartographic contributions. In 1852-4 the greatest expedition of all into this area, comprising four ships commanded by Captain Sir Edward Belcher, had an eastern division wintering in Wellington Channel and a western division at Dealy Island on Viscount Melville Sound. The north coasts of the western Parry Islands were closed by their surveys. Franklin's fate was discovered by Captain Sir Francis Leopold M'Clintock in 1859, removing this impetus for exploration.

Ostensibly engaged in the Franklin search, Dr. Elisha Kent Kane extended Inglefield's discoveries in Smith Sound northward to begin the American quest for the route to the North Pole. This search was pressed farther north by Dr. I. I. Hayes in 1860-1 and Charles

F. Hall in 1871. In 1875-6 Sir George Nares, one of those who had searched for Franklin with Captain H. Kellett in 1852-4, sailed in *H.M.S. Discovery* through Robeson Channel into the Lincoln Sea to winter on the north-east coast of Ellesmere Island. In 1886 Admiral Robert E. Peary of the United States Navy began the series of expeditions which culminated successfully in his arrival at the North Pole in 1909. Peary's former assistant, Dr. Frederick A. Cook, claimed to have preceded Peary to the Pole; but it is now generally conceded that, although Cook made a very creditable journey from Greenland across Ellesmere Island and around Axel Heiberg Island returning to his Greenland base by way of Jones Sound, he did not go to the Pole.

Captain Otto Sverdrup (1898-1902) relinquished a plan to circumnavigate Greenland which would have taken him into Peary's "territory", and made the greatest geographic contribution in this area since Parry's time during four years of explorations from bases on eastern and southern Ellesmere Island, using Nansen's former polar vessel, the *Fram*. Sverdrup discovered and mapped all of southern and western Ellesmere Island, much of north Devon Island, almost all of Axel Heiberg Island, and (in a more sketchy manner) delimited Ellef Ringnes, Amund Ringnes and King Christian Islands.

In 1915-17 Stefansson crossed M'Clure Strait to discover the present Islands of Brock, Borden, Mackenzie King, and finally the last island in the group, Meighen Island, west of Axel Heiberg.

Subsequent expeditions by Donald MacMillan (1913-17, 1923-4, 1925), E. Shackleton (1934-5), Robert Bentham (1936-8), D. Haig-Thomas (1937-8), and others covered these islands extensively from bases in Smith and Jones Sounds and did much towards filling in the details which most early explorers' maps so sadly lacked. Post-war activity in the region has resulted in the establishment and maintenance of several jointly operated Canadian-United States weather stations serviced largely by the U.S. Navy.

Mapping

As recently as 1950 the mapping of this

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great area was completely dependent on the surveys made by these explorers. Little new information had been collected in the twentieth century. However, in 1949 the Royal Canadian Air Force began a program which has resulted in the aerial photography of the entire Queen Elizabeth Islands. In the span of the next few years existing maps became obsolete as American and Canadian agencies vied with each other in the production of better maps of this area. The best ones currently available are from the presses of the Surveys and Mapping Branch, Department of Mines and Technical Surveys, Ottawa. Maps of the British Admiralty, which for long were the acme of mapping in this region, are now badly out of date.

Sovereignty and Administration

Until Confederation in 1867, the explorations of the Canadian Arctic Archipelago had been almost entirely British, and title to the islands remained vested in Great Britain; it was transferred to Canada only in 1880. American interest in this sector of the Arctic (which had begun with De Haven's search for Franklin in 1850-1) was resumed with the expeditions of Hayes (1860-1), Hall (1871-3), Greely (1881-4), Peary (1896-1902, 1905-6, 1908-9), Cook (1907-9) and, more recently, MacMillan. Norwegian interest developed with Sverdrup's discoveries between 1898 and 1902. Canada now claims title to all the islands in the sector between 60° and 141° west longitude, except for that part of Greenland lying west of the sixtieth meridian.

Like other regions in the Northwest Territories, the Queen Elizabeth Islands, which form part of the District of Franklin, are

administered by a Commissioner, who is the Deputy Minister of the Department of Northern Affairs and National Resources. With nine councillors and assisted by a Deputy Commissioner, he heads the Northwest Territories Council which meets twice a year, once in Ottawa and once in the Northwest Territories.

Geopolitical Setting

These islands form the most northerly lands in North America and extend to the northern tip of Ellesmere Island, which is less than 500 miles from the North Pole. Lying well north of the recently constructed "Dew Line" of radar stations, the Queen Elizabeths intervene between it and the northern Eurasian coast from which Cape Columbia is little more than 1,000 miles distant. They are on the edge of the impassable Arctic Ocean of mariners and the gradually developing Arctic Mediterranean of the Air Age on the fringes of which commercial aviation routes are already impinging.

North Magnetic Pole

The study of data concerning the North Magnetic Pole has occupied the attention of scientists since its discovery in 1831 on Boothia Peninsula by Sir James Clark Ross. Canadian magneticians have long been aware of its travel northward since Ross first located it. The trend of its movement is towards the Queen Elizabeth Islands, and its current position is reportedly in latitude $73^{\circ} 48'$ north, longitude 101° west. The Magnetic Pole is subject to certain cyclic and disturbance variations which extend it over an elliptical zone whose major axis is oriented northwest-southeast and is about 50 miles long. Within the next fifteen years or so, it is most likely that the margin of this zone will have reached southern Bathurst Island, should its present northward trend continue.

Geology

The Queen Elizabeth Islands are largely formed of sediments lying on the gently dipping northern border of the Canadian Shield. These sediments dip generally towards the north-west, and become progressively younger from south-east to north-west. Remnants of

The day's catch — a bearded seal at Alert, Ellesmere Island.

S. D. MacDonald





A striking view of Coburg Island, which lies in the eastern entrance to Jones Sound. This eastward view shows the ice-free waters of Baffin Bay in the background and Lady Ann Strait in the foreground. The line of fast ice extends westward in spectacular contrast with the dark waters of the Strait. Coburg Island is of Precambrian formation and has a predominantly ridge and valley topography. The open waters of Baffin Bay provide the moisture feeding its ice-fields, which are very active considering their size.

the Shield persist in eastern Devon and south-eastern Ellesmere Islands. Another much smaller remnant occurs on the north coast of Ellesmere Island.

The major structural element of the islands is a belt of folded sediments which stretches with little interruption from Prince Patrick to Cornwallis Island, and from south-western Ellesmere Island northward through the heart of the island and north-eastwards to Robeson Channel. It continues across north-western Greenland through Iceland and Spitzbergen to north-western Europe. The speculative age of the folding on the Queen Elizabeth Islands varies from pre-Devonian in the west to Mesozoic in the north; it probably occurred in several stages. These folds cover most of Ellesmere and Axel Heiberg Islands, as well as the western Parry Islands.

South-east of the folds, primarily on Devon and southern Ellesmere Islands, a horizontally-bedded series of early Palaeozoic sandstones, limestones and conglomerates intervene between the folds and the Precambrian crystalline rocks. These formations thin eastward where they make contact with granites and metamorphic rocks of Archaean age.

North-west of the folds a series of softer rocks of Mesozoic age comprise many of the low islands such as Brock, Borden, Mackenzie King, Cornwall, Buckingham and the Ringnes Islands; they also form parts of north Melville and Bathurst Islands and west Axel Heiberg Island. These formations are characterized by a series of large domes which are to be found along a line stretching from Sabine Peninsula on Melville Island through the Ringnes Islands to Axel Heiberg Island. These structures strongly suggest interesting petroliferous deposits in this sector, comparable to occurrences along the Gulf coast of Texas.

Permafrost

As in most parts of the Arctic, permafrost is indigenous to the area. Ill-drained surfaces of unconsolidated material towards the end of summer have an active layer that is probably no more than two feet in depth, though few detailed studies are available on this subject. Mud-flows and other solifluctational phenomena are common. In the western islands the instability of the clayey or muddy surfaces under foot is the subject of more than one explorer's journal entries, even in fairly modern



North-eastern Devon Island — a view of the north coast and Jones Sound across the Devon Ice-field. In the centre is the large Belcher Glacier which terminates near the coast in a steep-faced heavily crevassed section from which small icebergs and bergy bits are discharged. The underlying rock formations here, seldom exposed except on cliff faces and valley walls, are of Precambrian age. Several patrols of the Royal Canadian Mounted Police have used Belcher Glacier as a means of gaining access to the 6,600-foot summit of the Devon Ice-field when crossing the island from the R.C.M.P. post at Craig Harbour on southern Ellesmere Island to Dundas Harbour on southern Devon Island.



Eastern Ellesmere Island north of Bache Peninsula. This shows the north side of Princess Marie Bay to which Franklin Pierce, Copes, and Woodward Bays are tributary. Here the coastal cliffs are normally less than 1,000 feet high and consist of relatively horizontally bedded limestones and conglomerates of early Paleozoic age. Towards the right may be seen the margin of the fold belts which develop extensively to the north-west where structural ridges pierce the ice-fields to rise to heights exceeding 7,000 feet. The deeply entrenched dendritic drainage system in the immediate foreground is characteristic of this sector of the coast.

times. The depth of the permafrost is little known, but drill-holes at Resolute on Cornwallis Island indicate that it exceeds 1,000 feet. No other drilling is known to have been done in these islands.

Physiography

As a unit, the topography of the Queen Elizabeth Islands directly reflects its geological structure, with but rare exceptions. The hard crystalline Precambrian formations of eastern Devon and south-eastern Ellesmere Islands form resistant ice-covered highlands upthrust to elevations of 6,000 and 7,000 feet. The truncated strata of the fold belts with their indurated limestones, sandstones, shales and conglomerates, form a major orographic element of the island group, rising to elevations of 6,000 to 10,000 feet across Axel Heiberg and north-western Ellesmere Island. To the west, the Parry Islands' Fold Belt has been subjected to much more erosion, or perhaps the land was never raised to the same elevations as the mountainous folds to the north-east. Certainly, the relief here is much less, having a maximum of 3,000 feet in west Melville Island, and much less than that on Bathurst and Cornwallis Islands. Over large areas, the folds have been worn away to form erosional platforms over which their patterns are exposed like a terrestrial carpet, as on east Melville, Byam Martin and west Bathurst Islands.

These folds express themselves planimetrically as well as orographically. Hard, truncated strata of indurated sediments have withstood the effects of marine erosion to form smooth sectors of strike coasts on south-eastern Melville, north-eastern Bathurst and eastern Cornwallis Islands. Elsewhere, as on south Melville and western Bathurst Islands, parts of these hardened strata have formed spectacularly long narrow peninsulas, with consequent deep bays contiguous to them.

Between the folds and the Precambrian granites of the east, is a belt of horizontally-bedded early Paleozoic limestones and sandstones which forms most of the south coasts of Devon and Ellesmere Islands, but narrows to the north-east in the vicinity of Princess

Marie Bay. These strata also thin towards the east, where they overlie the ancient crystalline rocks. They form high sedimentary plateau lands, ranging in elevation up to 3,000 feet, deeply indented by straight-walled fiords and forming high talus-banked coastal cliffs such as those which have attracted the attention of travellers to the south coast of Devon Island since the discovery of the island. Similar cliffs occur on the north and south coasts of Jones Sound west of the Precambrian areas, and again narrowly along Bache Peninsula on Kane Basin. Steep-cliffed sedimentary formations are also found farther east along the Greenland coast on Kennedy Channel.

To the north-west, the folds margin a pocket of partially submerged Mesozoic formations forming an Arctic Piedmont Plain, comparable to that along the Atlantic seaboard of the United States. This formation extends through the Ringnes Islands, Meighen, Brock, Borden, Mackenzie King, Lougheed, Cornwall, and Buckingham Islands (together with several smaller ones), and also parts of north-west Bathurst, northern Melville and Prince Patrick Islands. This entire area is comparatively low and flat with little relief and normally develops low coasts along shallow shores. The drainage patterns tend to be dendritic and normal to the shore, some streams forming striking patterns. Deltaic deposits are a common feature of these shores.

Glaciology

Ice caps the highlands of some islands of the Queen Elizabeth group. There are indications that, possibly during the Pleistocene Period, ice moved westward from Greenland to deepen and enlarge preglacial channels on west Ellesmere and west Axel Heiberg Islands. To a lesser extent the east coasts of these islands have also been glacially excavated. Fiords may be found on their south coasts and on the north, east and south coasts of Devon Island. Glacial ice may possibly have been responsible for the excavation of some of the deep inlets of north Bathurst Island, west Melville and south-eastern Prince Patrick. In addition, ice has been a major factor in the



An eastward view across Sabine Peninsula in north-eastern Melville Island, showing the unusual digital deltas that protrude into the seas as much as six miles beyond the general coastline. They were formed by the flushing of erosional material from low inland hills estimated to be about 700 feet above sea level. Along the coast most streams terminate in broad braided channels that cut through earlier deposits of outwash material deposited at a time when the land stood higher. In the upper left are two unusual circular structures which are prominent features of the peninsula. Each is several miles in diameter. The more distant one was visited by Richards and Osborn in 1853 during the Franklin Search.



The ice-filled waters of the great trench incised along a straight axis into the east coast of north-east Ellesmere Island for a distance of nearly seventy miles. Here (in the foreground) it is about ten miles wide, faced with steep coastal cliffs nearly 2,000 feet high. In the background is the Greely-Hazen Plateau, with Lake Hazen in the right background below the mountains of the Garfield Range in Grant Land. This photograph, taken from an altitude of 20,000 feet, shows the entrance of Conybearae Bay into Archer Fiord, with Miller Island in its broad mouth. Not far from the extreme right is Discovery Harbour.



The depressions in southern Axel Heiberg Island which separate the Schei Ice-field (covering much of the southern extremity of the island) from the much larger Krueger Ice-field to the north. This westward view shows the great spatulate ice-lobes descending from both sides of the valley, forming terminal moraines which contribute to the great valley train discharging into Wolf Fiord. The more active glacial trench leading into Glacier Fiord, which is surrounded by the 7,000-foot peaks piercing the Schei Ice-field, may be seen in the left background.



The platform of contorted sedimentary rocks on the surface of north-eastern Bathurst Island (east of May Inlet) is shown in this eastward view. The area lies within the Parry Islands Fold Belt and forms a generally low plateau into which the drainage system is cutting channels forming a pattern which in places is strikingly angular. The principal drainage depressions, covered with braided streams, follow the strike of the folds, those transecting them being much shorter. Both are well entrenched in the shales, sandstones and limestones prevalent on the island.

erosion of some channels separating the islands—for instance, Robeson and Kennedy Channels, Hall and Kane Basins north-east of Ellesmere Islands, Eureka and Nansen Sounds to the west, and Jones Sound to the south, amongst others.

Distributed over more than 41,000 square miles at present, the ice consists of a number of residual deposits, mainly on Axel Heiberg, Ellesmere and Devon Islands. On Axel Heiberg Island two ice-covered areas exist, the more northerly one being the larger. Both attain elevations of 7,000 feet. On Devon Island the ice is confined to the eastern part and is generally coincident with the Precambrian areas. On Ellesmere Island the ice is more scattered. It has its most extensive development on Grant Land,¹ where it spreads over the greater part of the rough highland, attaining elevations approaching the 10,000-foot summits of the folded mountain ridges. Along the north-western coast of Grant Land is a fairly large exposure of shelf-ice, a relic of the glacial age. On Grinnell Land the ice also covers the highlands broadly, though not extending appreciably west of Canyon Fiord. The land ice is confined to eastern Sverdrup Land where the Prince of Wales Ice Field drains the east coast Precambrian highlands through several large fiords. On Lincoln Land, its expression is more broken: the largest ice cover is to the east near Baffin Bay, but several smaller fields lie on the coastal plateau remnants north of Jones Sound, especially near Sydkap Fiord. Finally, a number of small snow fields occur around the west end of Jones Sound on both Devon and Ellesmere Islands, fed by the year-long open waters of Hell Gate and Cardigan Strait.

Farther west, Meighen Island supports a small ice field, and minor occurrences of a semi-permanent nature are to be found in west Melville Island near the head of Purchase Bay, but elsewhere in these islands, the land is ice-free.

Oceanography

Little is generally known of the oceanography of the region or the closely related movement of ice through the numerous channels. In general, the current in the Beaufort Sea sweeps

eastward along the north margin of the Queen Elizabeth Islands with the major element flowing south-west towards Alaska. In Baffin Bay the Labrador Current swings anti-clockwise round the north end of the bay, encircling the open "North Water" which attracted whalers a century ago. The general mass movement of water is from the Beaufort Sea towards Baffin Bay. Currents move eastward from M'Clure Strait towards Lancaster Sound, fed by tributaries from the north and drained by wider channels to the south. Similarly, there is a strong flow through the narrows formed by Cardigan Strait and Hell Gate, draining Eureka Sound and Norwegian Bay into Jones Sound. Finally, the general movement along the east side of Ellesmere is south through Kennedy Channel and Smith Sound, discharging into Baffin Bay.

None of these channels among the islands is deep, with the exception of Lancaster Sound, which descends below 1,000 fathoms. Elsewhere, as to the north-west in Ballantyne and M'Clure Straits, they measure but a few hundred fathoms. In Barrow Strait north of the Precambrian exposures of Peel Sound, the depth is considerably less than a hundred fathoms. Jones Sound has a limited basin of about 800 fathoms, barred at its eastern threshold by a shallower Precambrian ridge. Eureka Sound is a typical glaciated channel, shallowest about Stor Island. Deeper waters (600 fathoms) occur in Smith Sound and Kennedy Channel.

Due to the effects of storms, the sea ice in the larger channels occasionally loosens up in winter, but in most passages freeze-up begins in October and break-up occurs in June or July. Local bay ice may be later in freeing itself. Sea ice may vary from six to eight feet in thickness, but some floes from the polar pack, according to reports, may be thirty feet thick, and segments of shelf ice from north-west Ellesmere Island, which are not of uncommon occurrence, may be considerably thicker. Well supplied with enormous bergs from glacial discharges along the Greenland coast and supplemented by local calving along the coast of east Sverdrup Land, icebergs are common along the east coasts of the Queen Elizabeth

¹ Ellesmere Island is considered here to be divided into four segments by its great east-west fiords. These segments from north to south are named Grant, Grinnell, Sverdrup and Lincoln Lands.

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Islands. They may occasionally enter Eureka, Jones, and Lancaster Sounds. But to the west they are rare.

Climate

Although high in latitude, the Queen Elizabeth Islands have been bequeathed a climatic reputation undeserved in severity. Meteorological data are gradually correcting the false impression as the facts about the Islands' climate are becoming known.

Dominated in the west by a high pressure ridge which stretches from Great Bear Lake north to the Sverdrup Islands, and to the south-east by a semi-permanent low pressure trough in Davis Strait and Baffin Bay, the unmodified air flow across the islands is from the north-east across Ellesmere Island. It is essentially a maritime climate, with extreme winter temperatures higher and extreme summer temperatures lower than would be normal for a continental area in the same latitude. The climate is one of long cold winters and brief cool summers. It is part of the land of the midnight sun in summer, and the land of the long night in winter.

Winters are cold. To the east, the climate is somewhat modified by the "North Water" of Baffin Bay, which reportedly remains open throughout the winter. At Dundas Harbour the mean annual temperature is 10° F., and slightly less at Craig Harbour (7° F.) and Bache Peninsula (4° F.). But west of the high mountain ridge of Ellesmere Island, the mean annual temperature drops to -4° F. at Eureka and Isachsen. The lowest minimum temperature of -63° F. has been recorded at three stations in the area — Eureka, Mould Bay, and Fort Conger. But this is mild compared with the North American record low temperature of -81.4° F. at Snag.

Summers are cool, but remarkably uniform. July daily maximum temperatures average about 45° F., with the minimum about ten degrees lower.

Precipitation is also low, varying from under ten inches annually at Dundas Harbour to a paltry 1.74 inches at Eureka. From this point of view, the land is little more than a desert. About one-third of the precipitation falls as rain during the summer months of July and August, accompanied by the low overcast skies

characteristic of the Arctic in summer. At one station, the sun shone in August for only seven per cent of the time possible. In consequence, visibility in summer is often curtailed by fog; it is best in winter, particularly during the month of April.

Even in the matter of winds, these islands cannot uphold their reputation. Records of measurements indicate a mean annual wind speed at Eureka of only 7.0 miles an hour, ranging to the greatest recorded mean of 10.6 at Resolute. Toronto, Ontario, has a mean annual wind speed of 11.4 miles an hour.

Human Geography and Archaeology

The Queen Elizabeth Islands lie north of the normal limits of human habitation. The Royal Canadian Mounted Police have operated posts sporadically on eastern Devon Island at Dundas Harbour and on Ellesmere Island at Craig Harbour and Bache Peninsula. Several weather stations have been operating continuously for nearly a decade with transient operational personnel. The most northerly Eskimo settlements occur in north Baffin Island at Arctic Bay and Pond Inlet. On Greenland, west coast settlements extend northwards to Thule and Etah (north of 78° north latitude). A few Eskimos have been moved by the Canadian government to the vicinity of weather stations and police posts in the Queen Elizabeths. Experimentally, small groups of several families have been moved from Baffin Island to better hunting grounds on eastern Devon and Ellesmere Islands. But there can be little doubt that these islands for long periods have been without a single human being.

Archaeological remains are of common occurrence along the coasts of many of these islands. The bony frameworks of dwellings of an ancient people are wedged into stony floors, tightly cemented into the ground by permafrost. They are found along the coasts of Viscount Melville, Lancaster, Jones and Eureka Sounds, Barrow Strait, Norwegian Bay, and Greely Fiord, and along the passages separating north Ellesmere Island from Greenland. They seem to indicate the migration of people of the Thule culture from Alaska through the Queen Elizabeth Islands to Greenland.



Looking westward to the low north coastal slope of Borden Island with Brock Island in the left background. Inscribed on what is probably a Mesozoic sandstone plain is this remarkable dendritic drainage pattern, made even more striking in many places by the contrasting whiteness of small snowfields. Near sea level the streams' braided channels broaden into outwash plains, while towards the west islets and ice-shove ridges become characteristic of the low coasts.



Collared lemming at Alert on Ellesmere Island.
S. D. MacDonald

Flora

The flora of the Queen Elizabeth Islands, like that of the Arctic in general, is primarily characterized by an absence of trees. A few woody plants occur, such as the arctic willow (*Salix arctica*) and the white heather (*Cassiope tetragona*), but for the most part the vegetation is low and stunted; though sporadically colourful in summer, it is luxuriant only to the eye of the enthusiastic botanist. Primarily grasses, sedges, and a few shrubs, much of the remainder is formed of the lower forms of plant life—the mosses, lichens, algae and fungi. It will not

develop well on the moving scree slopes which form the coasts of some islands, nor on flood-plains, nor on soils subject to solifluctional movement. Exposed to high winds in the highlands, plants tend to hug the surface, forming low flat cushions resistant to desiccation and abrasion. Plants, of course, do not grow on the ice-covered areas, of which over 40,000 square miles exist in these islands. Their habitat is mainly limited to lowlands near sea, stream or lake level, and below protected areas where snowdrifts supply moisture through the brief growing season. Plants grow slowly (a woody stem just over one inch in diameter has been reported by A. E. Porsild, Chief Botanist to the National Museum of Canada, to have 400 annual rings). This stunted vegetation has no direct economic significance, except as food for land animals.

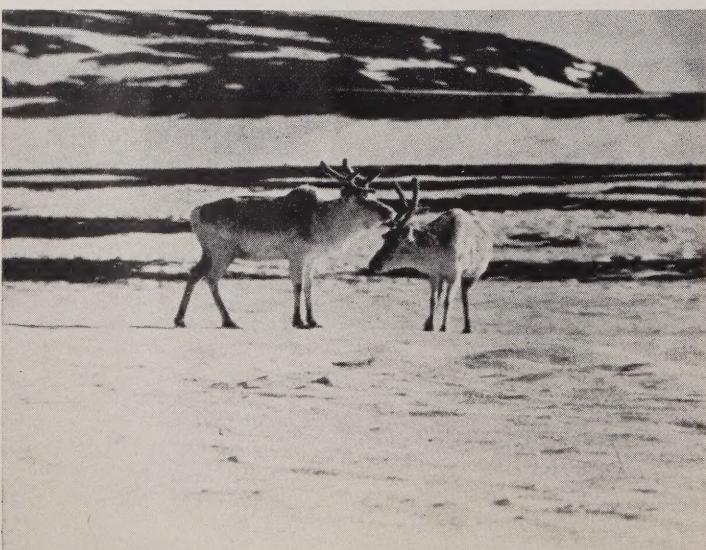
Fauna

Land animals in this area are not plentiful in numbers, and are restricted in species. Sea mammals and fish are of greater importance to any project involving native labour. Faunal life is subject to wide variability, according to season and area; but in general, animals tend to be more abundant toward Baffin Bay.

The most striking land mammal in the region is the musk-ox, which has been found in fossil (Pleistocene) form over much of northern Eurasia and once ranged as far south as Kentucky. These have been reported in sizable herds on Melville, Devon, Axel Heiberg and Ellesmere Islands. Their occurrence is particularly widespread on Ellesmere Island. In smaller numbers they have been seen on Cornwallis and Graham Islands.

Caribou are found on most of the Queen Elizabeth Islands at one time of year or another as far as the north coast of Ellesmere Island. Certain coasts, such as those of eastern Sverdrup and Lincoln Lands and western Axel Heiberg Islands, are relatively barren of flora and consequently are not good foraging-grounds for caribou or any other animal.

The other land animals in this region, in contrast to the two described, are white for part if



Peary caribou on Prince Patrick Island.
S. D. MacDonald

not all of the year. These are the polar bear, arctic fox, arctic wolf, arctic hare, weasel, and collared lemming. Coasts which certain animals avoid, such as those mentioned earlier, are avoided also by the polar bear and by the entire cycle of animals that feed upon each other. Polar bears are reportedly common along Lancaster and Jones Sounds, Barrow Strait, Norwegian Bay, and most particularly along Eureka Sound. These animals, which may attain a weight of 1,600 pounds, feed largely on seals.

The arctic wolf and fox both seem to be of widespread occurrence throughout the eastern sector of the islands at least, the former reportedly running in large packs in the Eureka Sound area. Lemmings are of cyclic occurrence, varying from scarcity to large numbers over a period of three or four years.

The sea mammals form an essential part of the Eskimo economy south of the Queen Elizabeths. Seals, walruses and whales are of great importance wherever Eskimos are located. These animals occur mainly along the coasts and inlets contiguous to Baffin Bay and are common in Jones and Lancaster Sounds, but are seldom seen west of Cornwallis Island or in Norwegian Bay. The bow-head whale, which a century ago was fairly common, has all but been exterminated from these waters. White whales are seen in numbers, as are occasional herds of Atlantic walruses. The seals (arctic ringed and bearded species), like the narwhal, are usually seen singly or in small numbers.

In the southern parts of the Northwest Territories fish are abundant along some coasts. In the Queen Elizabeth Islands they have not been found in large numbers in salt water. Fresh water fish (arctic char) have been reported in lakes on Cornwallis Island and Axel Heiberg Island and in Lake Hazen on northern Ellesmere Island.

Birds are common throughout the summer, particularly in the eastern parts of the region. Many of them nest on parts of Ellesmere Island. Geese, eider ducks, auks, gulls, ptarmigan, plovers, terns, and buntings are a few of those nesting near the northern tip of the island.

An arctic fox in winter on Ellesmere Island.
S. D. MacDonald



An arctic fox in winter on Ellesmere Island.
S. D. MacDonald

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These, then, are Canada's polar isles—the Queen Elizabeths. Isolated, naked and rugged, set in a sea of ice, they form the northern bastion of our continent. Long neglected and almost unknown, current geopolitical concepts have focused international attention upon them. What history may have in store for them is pure conjecture, but it is certain that the days of their neglect are past. In accordance with the prophecy made by Stefansson thirty years ago, scientists form the vanguard, pressing into these high latitudes, leading the "northward course of empire".





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The structural pattern of folded rocks exposed on the surface of Amund Ringnes Island, with Hassel Sound between it and Ellef Ringnes Island in the background to the west. Near the sea, where outwash plains develop, the structure is usually masked by these more recent deposits, but in the uplands the strike of the sediments is readily seen almost everywhere. Stream patterns in this sector of the island are rather lightly inscribed upon the land and have an angularity closely related to the structure of the sediments. Coasts here are low and deltas numerous.

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